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Indian Standard

SPECIFICATION FOR PIPETTES, OSTWALD-FOLIN TYPE

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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August 1969

Indian Standard

SPECIFICATION FOR PIPETTES, OSTWALD-FOLIN TYPE

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SPECIFICATION FOR PIPETTES, OSTWALD-FOLIN TYPE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 June 1969, after the draft finalized by the Medical Glass Instruments and Appliances Sectional Committee had been approved by the Consumer Products Division Council.

0.2 Preparation of standards for surgical instruments, medical equipment and apparatus, including medical glass instruments has been taken up at the instance of the Advisory Committee for Development of Surgical Instruments, Equipment and Appliances, Government of India.

0.3 This standard covers such requirements as are expected to help in providing uniform equipment to all laboratories.

0.4 B. S. 773 : 1968 'Specification for Ostwald-Folin pipettes', issued by British Standards Institution, has been taken as the basis for preparation of this standard.

0.5 This standard is one of a series of Indian Standards on pathological glass apparatus. Other specifications published so far in the series are:

IS : 3740-1966 Tubes, glass, for pathological work
IS : 3741-1966 Tubes, sedimentation
IS : 3742-1966 Pipettes, dilution, for haemocytometers
IS : 4067-1967 Tube, swab (West type), for throat
IS : 4068-1967 Ureometer, Doremus' type
IS : 4069-1967 Urinometer
IS : 4087-1967 Pipette for haemoglobinometers and blood pipettes for biochemical work
IS : 4363-1967 Drip counter
IS : 4364-1967 Pipettes, serological
IS : 4444-1967 Bottles, bacteriological
IS : 4445-1967 Filter and filter chamber for blood transfusion
IS : 4708-1968 Urine glass, conical
IS : 4754-1968 Staining troughs and jar

0.6 This standard contains clauses 9.1 and 10.1 which call for agreement between the purchaser and the supplier.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of test for pipettes, Ostwald-Folin type. These are one-mark bulb pipettes calibrated for delivery or for content and used in pathological work.

2. MATERIALS

2.1 The pipettes shall be made from clear, neutral, heat-resistant glass tubing (for definitions see IS: 1382-1961†). The glass shall 'pass the alkalinity test prescribed in IS : 2303-1963‡ for Type 1 glass.

3. TYPES

3.1 The pipettes shall be of the following two types:

Type 1 -pipettes adjusted for delivery with the last drop blown out by the method described in Appendix A.

Type 2 -pipettes adjusted for content.

4. CAPACITY

4.1 The pipettes shall be of nominal capacity 0·2, 0·5, 1, 2 and 3 ml.

4.1.1 *Type 1* -Capacity is defined as the volume of water at 27°C, expressed in millilitres delivered by the pipette at 27°C, when emptied from the graduation line to the jet and the last drop blown out as described in Appendix B.

4.1.2 Type 2 -The capacity is defined as the volume of water at 27°C, expressed in millilitres contained by the pipette at 27°C, when filled from jet to the graduation line as described in Appendix B.

*Rules for rounding off numerical values (*revised*).
†Glossary of terms relating to glass industry.
‡Method of grading glass for alkalinity.

Cl.3 ***Tolerances on Capacity*** -The tolerances on capacity shall be as given in Table 1.

TABLE 1 TOLERANCES ON CAPACITY

	Nominal Capacity, ml				
	0·2	0·5	1	2	3
Tolerance ± ml	0·003	0·004	0·005	0.006	0·010

4.2 The shapes and dimensions of the pipettes shall be as given in Table 2, and Fig. 1. It is recommended that pipettes should also comply with the dimensions given in Table 3.

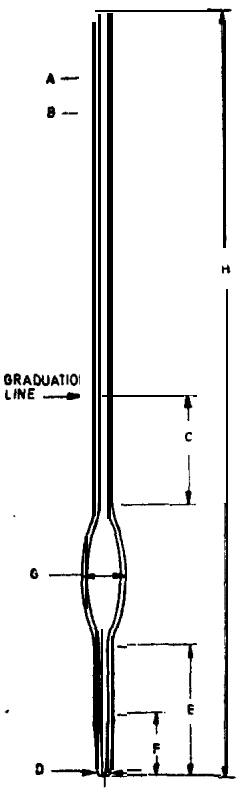

FIG. 1 PIPETTES, OSTWALD-FOLIN TYPE

TABLE 2 **MANDATORY** DIMENSIONS

(Clause 4.2)

DIMENSIONS*	NOMINAL CAPACITY, ml				
	0·2	0·5	1	2	3
Internal diameter of the suction tube (*A*), mm	1·5±0·3	1·7±0·3	2·0±0·3	2·3±0·3	2·7±0·3
Distance of graduation line from top of bulb, minimum (C), mm	10	10	10	10	10
External diameter of jet† (*D*), mm	2·0±0·5	2·0±0·5	2·0±0·5	2·0±0·5	2·0±0·5

**see* Fig. 1.

†For a jet with a ground finish this dimension is measured at the top of the bevel, not at the tip of the jet.

TABLE 3 RECOMMENDED **DIMENSIONS**

(Clause 4.2)

DIMENSIONS*	NOMINAL CAPACITY, ml				
	0·2	0·5	1	2	3
Wall thickness of suction tube (B), mm	2	2	2	2	2
Length of delivery tube† (*E*), mm	45	45	45	50	50
Length of tapered portion forming jet (*F*), mm	20	20	20	25	25
External diameter of bulb (*G*), mm	7	9	11	14	16
Overall length of pipette maximum (*H*), mm	230	240	250	260	260

*See Fig. 1.

†In making measurements of the length of the delivery tube, the tube is regarded as terminating where it begins to expand at the junction with the **bulb.**

5. WORKMANSHIP AND FINISH

5.1 The pipettes shall be well annealed, free from bubbles and, as far as possible, free from striae, stones and other visible defects (For definitions see IS :1382-1961*) and shall be symmetrical about their axes. The top of the pipettes shall be finished by grinding at right angles to the axis with a slight bevel outside, or by fire polishing to a smooth regular surface. The delivery jet shall be made with a long gradual taper which shall not have any sudden constriction at the orifice. The end of the jet shall preferably be ground smooth at right angles to the axis of the pipette and shall be slightly bevelled on the outside. Alternatively, the end may be finished by fire-polishing, provided that the requirements given in the clause are met. The pipettes shall pass the thermal shock test specified in **11.1.**

6. GRADUATION LINE

6.1 The graduation mark shall be a fine, cleanly etched permanent line of uniform thickness not exceeding 0·3 mm, completely encircling the pipette and lying in a plane at right angles to the axis of the pipette. It shall pass the permanency of marking test specified in 11.2.

7. DELIVERY TIME

7.1 Type l-The delivery time for Ostwald-Folin pipettes adjusted for delivery is the time occupied by the free descent of the water meniscus from the graduation line to the point at which it comes to rest in the jet, when the pipette is held vertical and the tip of the jet is in contact with the inside of a beaker held slightly inclined to the vertical. The delivery time thus determined shall be not less than 10 seconds nor more than 20 seconds for all sizes of pipettes.

The observed delivery time and the marked delivery time shall be within the above limits and shall not differ from each other by more than 2 seconds.

7.2 **Type 2 -The** orifice of the jet of pipettes adjusted for content shall be such that the delivery time is within the limits specified in Table 4, but the delivery time shall not be marked on the pipettes.

TABLE 4 DELIVERY TIMES FOR TYPE 2 PIPETTES

	Nominal Capacity, ml				
	0·2	0·5	1	2	3
Delivery time, seconds	3 to6	4 to a	5 to 10	7 to 15	10 to 20

*Glossary of terms relating to glass industry.

8. MARKING

8.1 Each pipette shall be marked permanently and legibly with the following inscriptions:

a) Name of the manufacturer, his initials or trade-mark;

b) Nominal, capacity in ml;

c) Inscription '27°C' to indicate that the pipette is calibrated at 27°C;

d) Inscription 'Ex' to indicate that the pipette is adjusted for delivery or inscription 'In' to indicate that the pipette is adjusted for content;

e) For Type 1 pipettes, Delivery time; and

f) On pipettes of Type 1 (adjusted for delivery) the word 'blowout' and/or a band of matt surface (ground or sand blasted) 3 to 5 mm wide at 15 to 20 mm from top of the suction tube, to indicate that the liquid remaining in the jet after free delivery has ceased is to be gently blown out to obtain the full delivery capacity.

8.1.1 The pipette may also be marked with 'the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system. which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licrnce for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. PACKING

9.1 Each pipette shall be packed as given in 9.1.1 or as agreed to between the manufacturer and the purchaser.

9.1.1 Each pipette shall, be enclosed in cardboard carton, cushioned with cottonwool at both the ends.

10. SAMPLING

10.1 Sampling and acceptance criteria shall be as agreed to between the purchaser and the supplier preferably as given in IS :4426-1967*.

11. TESTS

11.1 Thermal Shock Test-The pipettes shall be boiled in water for 30 minutes then immersed in water at 20°C. The pipettes shall not chip or crack.

*Method of sampling laboratory glassware and medical glass instruments.

11.2 Permanency of Graduation -The pipettes shall be immersed in a chromic acid mixture* and kept there for 15 minutes. The pipettes shall then be rinsed thoroughly in distilled water and dried thorougly. This shall be repeated once. There shall be no fading of the graduation marks.

APPENDIX A
(Clause 3.1)

METHOD OF USING TYPE 1 PIPETTES

A-l. PROCEDURE

A-l.1 The pipette is held in a vertical position with the jet downwards and filled to a short distance above the graduation line, the liquid being retained in the pipette by pressing a finger on the top of the suction tube. Any liquid remaining on the outside of the delivery jet is removed. By reducing the pressure of the finger, liquid is allowed to run out slowly. As the descending liquid surface approaches the graduation line the pressure of the finger is increased so that the liquid surface is brought to rest with the lowest point of the meniscus (see Note) in the horizontal plane containing the top edge of the graduation line. The drop of liquid then adhering to the jet is removed by bringing the inside of a suitable vessel, for example, a beaker, into contact with the jet and detaching the drop on to the side of the vessel. The receiving vessel is placed beneath the pipette, inclined slightly so that the tip of the jet of the pipette is in contact with the inside of the vessel. The finger is then removed from contact with the top of the pipette to allow delivery of the liquid into the rereiving vessel. Free delivery of the liquid into the receiving vessel is allowed without restricting the rate of outflow. When free delivery ceases and the meniscus comes to rest in the jet, the remaining liquid *is* gently blown out while the jet is rotated in contact with the side of the receiving vessel. To avoid any suck back due to capillary attraction, the jet should be removed from contact after the last drop of liquid has been blown out and before blowing ceases.

NOTE — The meniscus can be dear&defined by folding a strip of black paper round the pipette, the top edge of thr paper being not more than l mm below the graduation line. The meniscus so shaded is viewed against a white background.

*Chromic acid mixture composition:

Sodium dichromate	200 g
Water	1 000 ml
Sulphuric acid	1 500 ml

APPENDIX B

(*Clauses* **4.1.1** *and* 4.1.2)

DETERMINATION OF CAPACITY

B-l. GENERAL

B-1.0 When determining the capacity of a pipette, the procedure in **B-l.1** and **B-l.2** is to be observed, the pipette having first been thoroughly cleaned.

B-l.1 Type 1 -Using the procedure described in Appendix A, the pipette is filled with pure water and allowed to deliver into a suitable receiving vessel, for example, a covered beaker or weighing bottle, containing some water and which has previously been counterpoised against a similar vessel of the same diameter also containing water. The weight of water thus delivered is determined by re-weighing the receiving vessel. During the whole operation, the receiving and tare vessel should be treated alike as far as possible and in particular they should be covered and uncovered at the same time.

All operations are carried out at room temperature. The volume of water delivered by the pipette at 27°C is calculated by applying a correction for water temperature and, where necessary, for air temperature and pressure to the weight of water delivered in the receiving vessel.

NOTE — If a single pan balance is used, both vessels are weighed in turn before the contents of the pipette are emptied into one of them; both vessels are then re-weighed in the same sequence and allowance is made for any loss in weight exhibited by the ' control ' vessel.

B-l.2 Type 2 -The weight of the empty dried pipette is determined. The pipette is clamped in a vertical position with the jet downwards, and filled with pure water to a short distance above the graduation line, the water being retained **in** the pipette by pressing a finger on top of the suction tube. Any water remaining on the outside of the delivery jet is removed. By reducing the pressure of the finger, water is allowed to run out slowly. As the descending water surface approaches the graduation line the pressure of the finger is increased so that the water surface is brought to rest with the lowest point of the meniscus (see also Note under **A-1.1) in the** horizontal plane containing the top edge of 'the graduation line. The drop of water adhering to the jet is removed by bringing the inside of a suitable vessel, for example, a beaker, into contact with the jet and detaching the drop on to the side of the vessel. By releasing the pressure of the finger the pipette is allowed to drain into a suitable receiving vessel, for example, a covered beaker or weighing bottle, containing some water

and which has previously been counterpoised against a similar vessel of the same diameter also containing water. The pipette is re-weighed to determine the weight of water left inside it and the weight of water which drained from the pipette is determined by re-weighing the receiving vessel. These two weights are combined to give the total weight of water contained by the pipette and the volume contained at 27°C is calculated by applying a correction for water temperature and, where necessary, fhr air temperature and pressure.

NOTE — If a single pan balance is used, both vessels are weighed in turn before the contents of the pipette are emptied into one of them; both vessels are then re-weighed in the same sequence and allowance is made for any loss in weight exhibited by the 'control' vessel.

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